

BEFORE THE  
POSTAL REGULATORY COMMISSION  
WASHINGTON, D.C. 20268-0001

PERIODIC REPORTING  
(PROPOSAL ELEVEN)

Docket No. RM2016-1

**RESPONSES OF THE UNITED STATES POSTAL SERVICE  
TO QUESTIONS 1-9 OF CHAIRMAN'S INFORMATION REQUEST NO. 1**  
(November 6, 2015)

The United States Postal Service hereby provides its responses to Questions 1-9 of Chairman's Information Request No. 1, issued October 30, 2015. The questions are stated verbatim and followed by the response.

Respectfully submitted,

UNITED STATES POSTAL SERVICE

By its attorney:

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November 6, 2015

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1. The Postal Service states that “digital letter mail estimates utilizing the ratio estimator applied to the digital letter mail sampling frame would be combined with direct expansion estimates from the non-digital sampling frame.” Petition at 2.
  - a. Please confirm that the proposed ratio estimator will be applied only to the Mail Exit Points (MEPs) transitioned to digital sampling.<sup>1</sup> If not confirmed, please explain how the ratio estimator will be applied to MEPs, and the rationale for the change.
  - b. Please provide a detailed description or an illustrative example of the proposed procedure for combining the estimates from digital and non-digital sampling frames.

**RESPONSE:**

- a. Confirmed.
- b. Because the digital and non-digital frames form non-overlapping independent strata, each stratum is independently estimated and aggregated as in any other stratified sampling design. Suppose  $t$  is the national-level total revenue of First-Class Single Piece (F-C SP), then  $t$  is estimated by the estimator

$$\hat{t} = \hat{t}_d + \hat{t}_{nd}$$

where the digital portion is denoted by  $\hat{t}_d$ , the proposed estimator, and the non-digital portion by  $\hat{t}_{nd}$ , the current direct expansion estimator.

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<sup>1</sup> See Docket No. RM2015-11, Order No. 2739, Order on Analytical Principles Used in Periodic Reporting (Proposal Three), September 30, 2015, at 3.

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2. The Postal Service states that “[f]or each MEP assigned to the digital letter mail sampling frame, auxiliary information was obtained as to what portion of its delivery points were business related. The auxiliary information is maintained by Delivery Operations by route and zone. Five strata were defined based on this proportion.” Petition at 7.
- a. Please provide the proportions for each of the five defined strata and the number of sample areas.
  - b. Please provide the methodology for the stratification of Delivery Operations by routes and zones.

**RESPONSE:**

- a. The boundaries of the five BDP strata are  $(0, 0.04]$ ,  $(0.04, 0.06]$ ,  $(0.06, 0.08]$ ,  $(0.08, 1]$ , and (Box and Highway delivery points only) whereas  $(a, b]$  denotes a set of real numbers greater than “a” and less than or equal to “b.” There are currently 190 sample areas.
- b. Zones consist of multiple routes, but routes are not used for stratification as the sampling units are zones. BDP value is computed for each zone based on the number of delivery points from all routes constituting the zone, and used for stratification.

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3. The Postal Service states that “[p]roportions of business delivery points (BDP) to total delivery points are computed for all digital MEPs and divided into 5 groups based on BDP values.” *Id.* Appendix A at 2. Please define the term “BDP values.” *Id.*

**RESPONSE:**

BDP values refer to the proportions of business delivery points to the total delivery points. For example, if there are 20,600 delivery points for zone 20001, of which 1,712 are business, then the BDP value for zone 20001 is  $1712/20600$ , or 0.083.

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- 4.** For each digital MEP, the Postal Service categorizes a delivery point as "residential or business." *Id.*
- a. Please identify the source (*e.g.*, Address Management System or special study) used to distinguish between business and residential delivery points in the proposed stratification.
  - b. Please provide the rationale for not breaking down delivery points further into additional groups (*e.g.*, City Carrier delivery, Rural Carrier delivery, PO Boxes, and Highway contract routes).

**RESPONSE:**

- a. The source is the Universal Delivery Statistics File from the Address Management System.
- b. There are over 900 strata under the proposal. With the limited overall sample size, even finer stratification could potentially deteriorate the accuracy of estimates, as it could lead to strata with no or very small sample sizes.

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5. Based on coefficient of variation (CV), the Postal Service forecasts a reduction of 15-20 percent in volume and 5-10 percent in revenue for First-Class Single-Piece. *Id.* at 10.
- a. Please provide the data and calculations underlying the development of these CVs and conclusions.
  - b. Please provide a numerical example of the calculation of the ratio estimator.

**RESPONSE:**

- a. Please refer to the pdf file "ChIR.1.Q.5.Appendix" for the formula applied, and to the spreadsheet "ChIR.1.Q.5.Attach.xls" (worksheets labelled FY15PQ1, FY15PQ2, and FY15PQ3) cells N19 and N25 for the predicted reduction in CVs of F-C SP pieces and F-C SP revenue, respectively. These files are attached to this response electronically.
- b. Please refer to "ChIR.1.Q.5.Attach.xls," worksheet labelled Example, for a numerical example of the ratio estimator. The example illustrates how and at which stages EOR counts are applied to improve the accuracy of national-level F-C SP volume estimate. Test day EOR counts are used (column N) in obtaining test-level estimates, and one-way strata (BDP) level EOR total counts (cells F12 and I12) are compared with respective estimated total volumes (cells W4 and W15) in obtaining the ratio adjustment factors in column X. In the example, the total volume estimate (cell W4) is larger than the EOR total count for BDP1 stratum (cell F12), and as a result, its F-C SP estimate is reduced by the ratio factor in cell Y4. The opposite adjustment in direction is applied to BDP2

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stratum, as the total volume estimate (cell W15) is less than its EOR total count (cell I12). The national-level F-C SP volume estimates "with" and "without" the ratio adjustment are shown in AA4 and AB4, respectively. If there were no difference in stratification between the proposal and the current designs, the current production estimator would have produced the estimate in cell AB4 (without ratio adjustment). Please note that the ratio estimator would automatically fill in strata with no sample (SA3/BDP2 in the example) via the ratio adjustment factor.

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6. The Postal Service provides estimates for the “critical correlation” and “actual correlation” calculated by period in FY 2015. It states “that the ratio estimator will have a lower variance than the expansion estimator if and only if

$$\rho \geq \frac{1}{2} \frac{(\text{CV of average EOR count})}{(\text{CV of average revenue of 1-C SP})} \quad (3.10),”$$

where, “CV” is a coefficient of variation; “EOR” means End-of-Run, “1-C SP” represents First-Class Single-Piece [Mail], and “ $\rho$ ” is the actual correlation between “EOR count” and “1-C SP revenue.” *Id.* The Postal Service explains that “we respectively call the left-hand and the right-hand sides of the inequality [3.10] ‘actual correlation’ and ‘critical correlation’ [between ‘EOR count’ and ‘1-C SP’ revenue].” *Id.*

- a. Has the Postal Service conducted any type of sensitivity analysis to determine the scale of potential variation in the correlation estimates using different postal quarters and/or fiscal years? Please provide the results of such analysis, if available.
- b. Please confirm whether the Postal Service has considered the possibility that the inequality (3.10) may be invalid under certain conditions and/or in a certain period. Please explain the rationale for your response.

**RESPONSE:**

- a. As provided in Proposal Eleven, the Postal Service conducted the correlation analysis for the three quarters of fiscal year 2015. No other such analysis was conducted.
- b. Based on the analyses conducted for three quarters of FY2015, it is highly unlikely that (3.10) becomes invalid under any circumstances we envision. Because a significant portion of the EOR counts are the sum of presort, standard, and F-C SP, (i.e., EOR count is a linear function of F-C SP), an increase in F-C SP volume is logically expected to increase EOR count.



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Circumstance under which (3.10) theoretically could become invalid occur if there were no linear association between EOR count and F-C SP volume. This would happen only if absolute F-C SP volume were stable regardless of fluctuations in EOR counts, in which case the percentage share of F-C SP volume (among total EOR pieces) would fluctuate as EOR counts fluctuate. The Excel file ChIR.1.Q.6.Attach.xls, attached electronically to this response, contains volumes of F-C SP, F-C presort, and various Standard mails and their percentage share volume for four quarters of FY14 and three quarters of FY15 from RPW reports. Although the volumes are at national-level, the percentage shares of F-C SP volume are stable over periods, indicating a strong positive correlation (0.8102) between F-C SP volume and Total volume (used as a proxy of national-level EOR total). In other words, the theoretical possibility that there could be no linear association between EOR counts and FC-SP volume is extremely remote on both logical and empirical grounds.

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7. The Postal Service expects "some reduction in variance through stratification based on BDP." *Id.* Please provide the rationale for this statement.

**RESPONSE:**

Mail mixtures between residential and business are expected to be different. For example, a zone containing business facilities that receive payments from their customers tend to have more stamped F-C SP mails. On the other hand, residents receive large volumes of advertising mails that are mostly Standard or Presort mails. Therefore, we expect that mail mixtures between the zones with very few business delivery points and zones with more business delivery points to be correlated with F-C SP volume and revenue. Consequently, the BDP is likely to help create homogeneous strata.

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8. Please provide a table with coefficients of variation, critical correlations, and actual correlations for the prior three quarters for "US Postal Service mail" and "Free Mail" included in second-pass operations.

**RESPONSE:**

The requested information is provided in the following tables.

Table for US Postal Service Mail:

Period	Variable	CV	Cri. Corr.		Act. Corr.
FY15PQ1	EOR	0.0075			
	Pieces	0.0837	0.0449	<	0.0523
FY15PQ2	EOR	0.0080			
	Pieces	0.0749	0.0537	<	0.0783
FY15PQ3	EOR	0.0080			
	Pieces	0.0936	0.0426	<	0.0723

Table for Free Mail:

Period	Variable	CV	Cri. Corr.		Act. Corr.
FY15PQ1	EOR	0.0075			
	Pieces	0.2418	0.0156	<	0.0453
FY15PQ2	EOR	0.0080			
	Pieces	0.5565	0.0072	<	0.0289
FY15PQ3	EOR	0.0080			
	Pieces	0.2146	0.0186	<	0.0255

As USPS mails and Free Mails are rare, CVs for such mails tend to be significantly higher than those for more prevalent mails such as F-C SP. Consequently, the criterion (3.10) suggests the superiority of the ratio estimator even when the actual correlation is very small.

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9. The Postal Service states that the proposed estimator is asymptotically unbiased. *Id.* at 6.
- a. Please provide the expected number of pieces to be sampled at an MEP by strata by day.
  - b. Please provide the number of tests to be allotted for a stratum.

**RESPONSE:**

- a. The targeted number of pieces to be sampled is 175 pieces for a single test.
- b. The range of the number of tests allotted for a stratum is expected to vary between 3 and 60 per quarter, which makes the average number of tests allotted to be approximately 10 tests per quarter, where strata are taken as two-way classification by sample area and BDP. However, for strata defined as one-way classification by BDP (collapsed over sample areas) to which ratios are applied, the number of tests allotted varies from 1,500-2,000 tests per quarter for the first four BDP strata, to about 60 tests for the last stratum described in the response to Question 2.a of this Information Request. Over 250,000 mail pieces are expected to be sampled at one-way strata level.